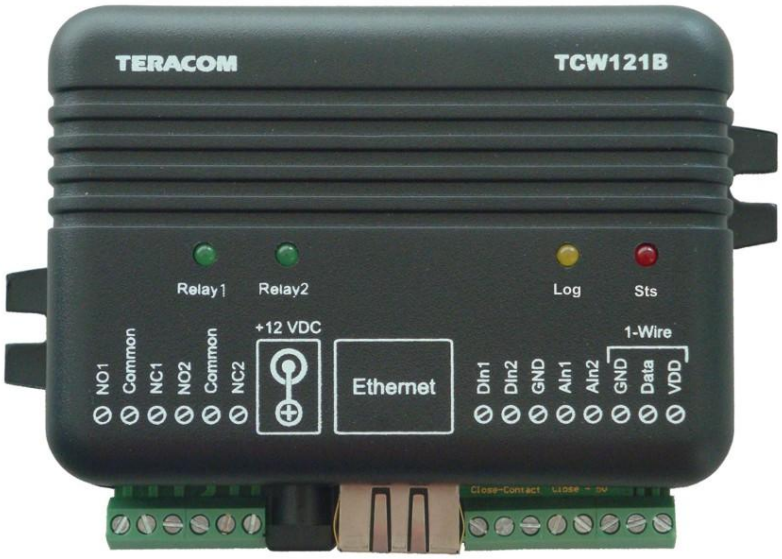
Ethernet controller TCW121B (FW2.xx)
User manual



1. Short description

TCW121B is a multifunctional device for remote monitoring and management. It is an Ethernet based controller, which is designed to work in IP-based networks and managed by WEB interface or SNMP programs. Its I/O interface - relay outputs, analog and digital inputs, is suitable for solving specific problems in various fields such as remote control, alarm systems, industrial process automation, control and management of computer networks etc.

2. Features

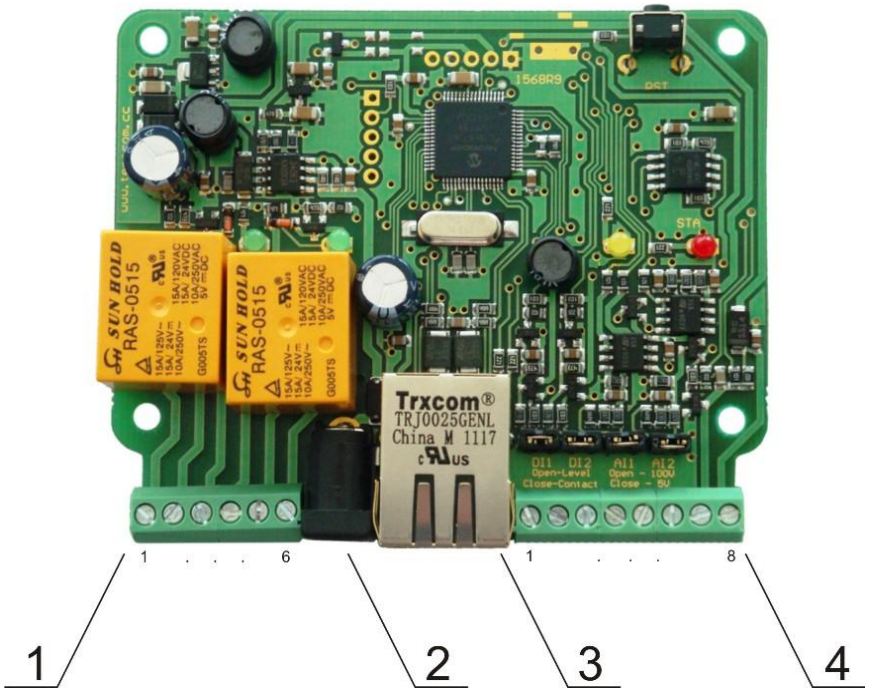
- 10 Mb Ethernet connectivity;
- Password protected web based configuration and control;
- 2 digital inputs with "logic level" and "dry contact" modes;
- 2 analog inputs with 0 to 100 VDC;
- 2 relays with NO and NC contacts;
- Long 1-Wire support, for up to 2 temperature sensorsTST1XX or up to 2 temperature/humidity sensors TSH2xx;
- Temperature & humidity monitoring and control;
- SNMP v.1 support;
- SMTP with authorization (SSL is not supported);
- Sending SNMP Traps messages under certain conditions;
- Sending E-mail messages under certain conditions;
- XML and HTTP API commands;
- Remote firmware update.

3. Technical parameters

Supply voltage, VDC	12±2
Maximum current (with both relays ON), mA	170
Weight, g	106
Dimensions, mm	107 x 72 x 32
Operating temperature, °C	0 to 40
Minimum high level input voltage for digital inputs, VDC	2.5
Maximum low level input voltage for digital inputs, VDC	0.8
Maximum input voltage for digital inputs, VDC	5.5
Analog input 1 range, VDC	0 to 100
Analog input 2 range, VDC	0 to 100
Maximum switchable current (at 220 VAC) , A	1
Maximum switchable voltage, VAC/VDC	250/110

4. Connectors

Inputs and outputs locations are shown below:



Connector 1 – 6-pin connector pinout is shown in the table below:

Pin	description
1	Relay1 normally open
2	Relay1 common
3	Relay1 normally closed
4	Relay2 normally open
5	Relay2 common
6	Relay2 normally closed

Connector 2 – power connector (center positive).

Connector 3 – RJ45 Ethernet connector

Connector 4 – 8-pin connector pinout is shown in the table below:

Pin	description
1	Digital input 1 (**Din1**). Operating mode is selected by jumper DI1- dry contact (close) and logic level (open).
2	Digital input 2 (**Din2**). Operating mode is selected by jumper DI2 - dry contact (close) and logic level (open).
3	GND
4	Analog input 1 (**Ain1**). For proper operation jumper AI1 should be open.
5	Analog input 2 (**Ain2**). For proper operation jumper AI2 should be open.
6	GND
7	1-Wire data
8	1-Wire power supply (5VDC)

5. LED indicators

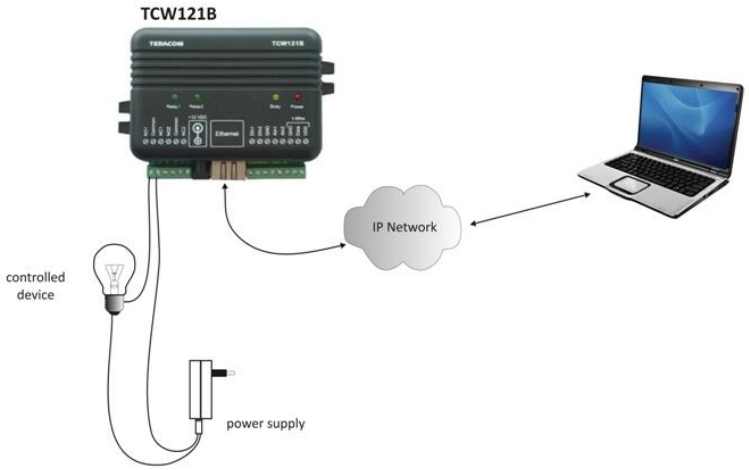
The following indicators show the status of the controller:

- **Relay1**/**Relay2** (green) – these LEDs are illuminated whenever the corresponding relay is activated (the NO contact is closed and the NC contact is open);
- **Sts** (red) – this flashes when the power supply is turned on;
- **Log** (yellow) – this LED indicates that someone is connected to the controller through the web interface;
- **Link** (green) – this LED is located on the Ethernet connector. It indicates that the device is connected to the network;
- **Act** (yellow) – this LED is located on the Ethernet connector. It flashes when activity is detected on the network.

6. Example Applications

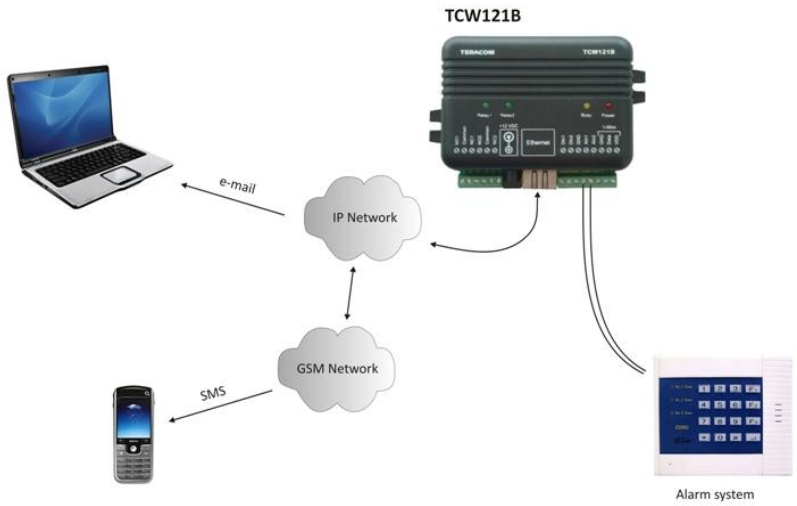
6.1 Remote control

The controlled device is connected in series with the relay contacts. Users can operate **TCW121B** using a web browser or SNMP application. Both relays are managed independently.



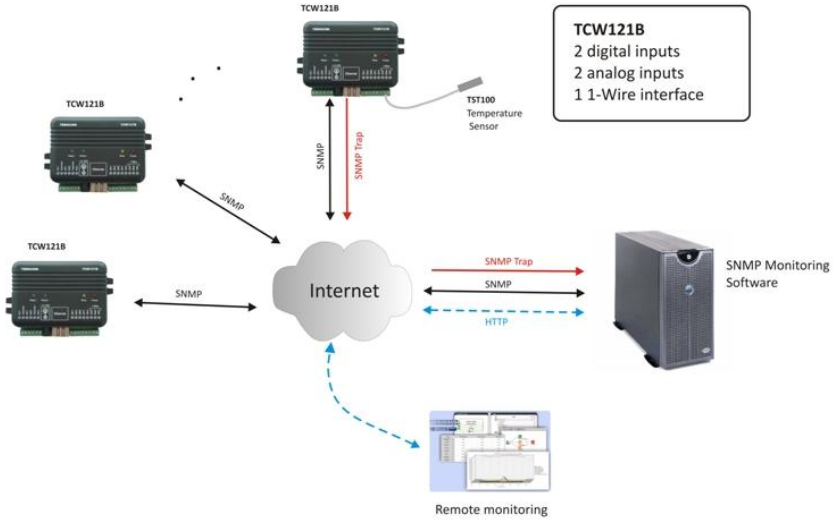
6.2 Remote monitoring

A relay contact of monitored device is connected to the digital input. When an event occurs – the controller can sends an e-mail and/or SNMP trap.



6.3 Data acquisition

The **TCW121B** can be used in Data Acquisition Systems (DAQ). The device uses SNMP v.1 protocol for communication with monitoring and management software applications.



7. Installation

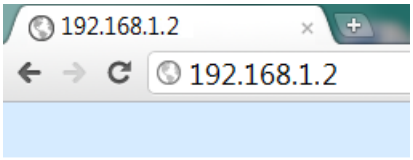
Please follow the steps below for proper installation :

1. Mount the controller in a dry and ventilated place.
2. Connect the Ethernet port to a 10/100MB Ethernet network. For direct connection to a PC use a “crossover” cable.
3. Connect the I/O pins of the controller according to the required application.
4. Connect the power supply.

If the red LED blinks, the power supply is OK. By default **TCW121B** comes with the following network settings:

IP address: ***192.168.1.2,*** *Subnet Mask:* ***255.255.255.0,*** *Default Gateway:* ***192.168.1.1***

Communication with **TCW121B** can be established by assigning a temporary IP address to the computer. This address should be in the same network (for example 192.168.1.3). To get access to the web interface, you should type http://192.168.1.2 into the browser.



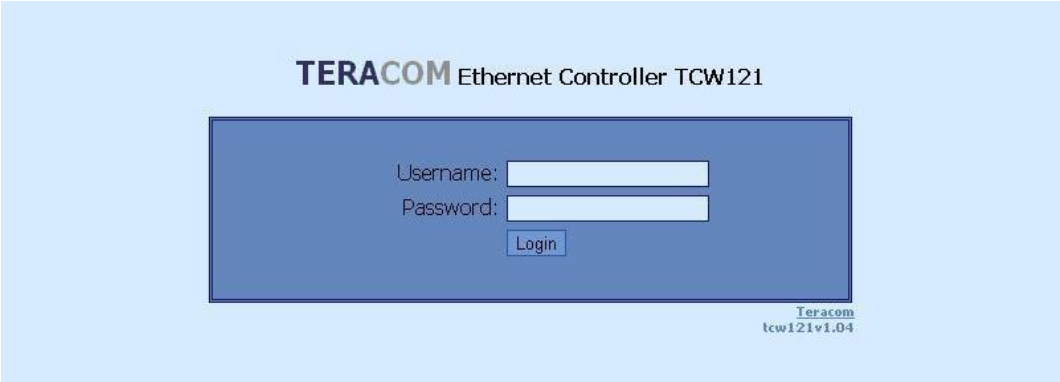
If the network settings are correct, the "Login" page will appear.

8. Web-based setup.

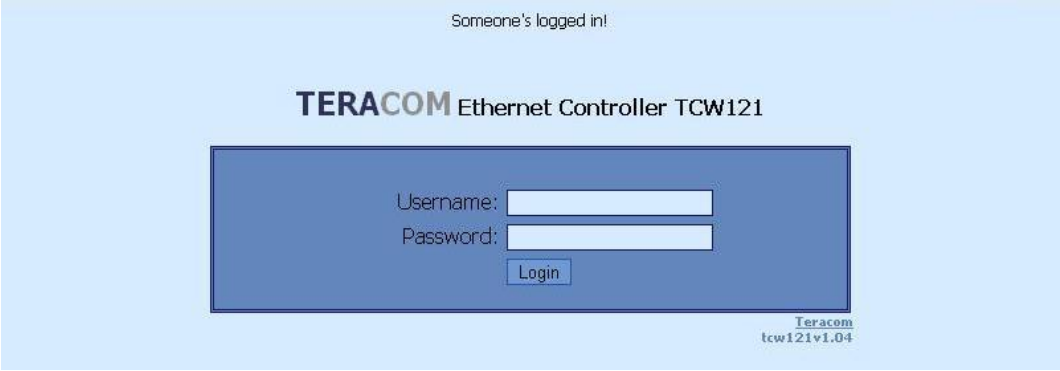
The web based interface allows configuration, monitoring and control. Recommended browser is Internet Explorer at 1024x768 resolutions.

8.1 Login page

After opening the Login page, authorization data must be entered (by default username=admin , password=admin). It is recommended to change the username and password to prevent unauthorized access to the controller.



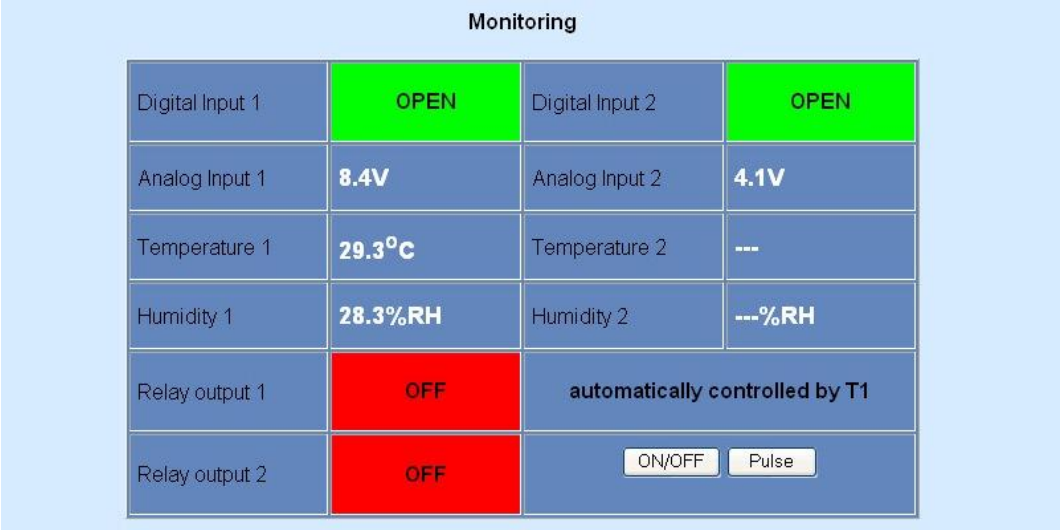
The controller supports one active session – only one user can operate the device. If another user tries to login, the message "Someone's logged in" appears:



The active session will be terminated automatically, if the current user stays inactive for 2 minutes.

8.2 Monitoring page

After successful authorization, the “Monitoring” page appears:



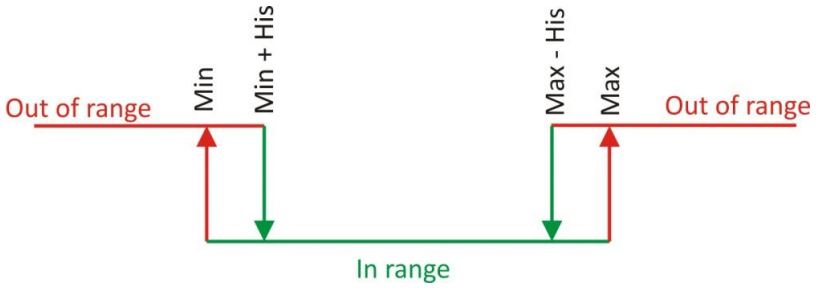
The “Monitoring” page provides information about the state of the relays and digital inputs, values of analog voltages (applied on analog inputs), temperature and humidity.

The state of the relay can be changed by appropriate “ON/OFF” button. To change the state of relay for specified time “Pulse” button should be pressed. Duration of the pulse is specified in “Pulse Duration” field of “I/O Setup” page.

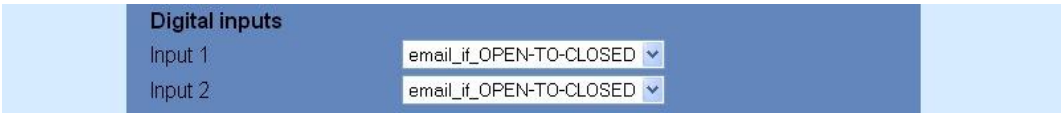
8.3 I/O setup page

I/O settings can be made here. For temperature, humidity and analog value MIN, MAX and HISTERESYS values can be set. These values define the thresholds for all monitored parameters.

When the measured value goes out of range SNMP trap or e-mail (if enabled) will be sent. Leaving range is considered when the parameter goes lower than MIN values or higher than MAX. Coming back in the range is considered when the parameter goes higher than (MIN + HISTERESYS) or lower than (MAX – HISTERESYS).



For digital inputs, conditional e-mail sending can be arranged by following part of the page:



Relays can be activated automatically depends of value of monitored parameter (humidity, temperature, analog voltage and changes on digital inputs) or manually. Only one parameter can be assigned for relay activation, at the same time:

When manual activation is selected, “Pulse” and “ON/OFF” buttons on “Monitoring” page are active. The duration of pulse for relay activation can be set from 1 to 253 seconds.

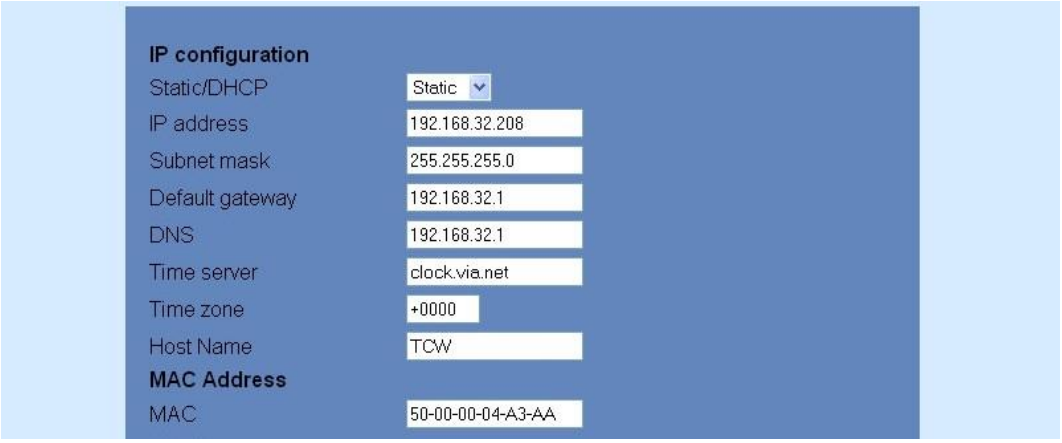
For all monitored parameters only one e-mail recipients can be set.

Automatic monitoring page refresh interval can be set from 1 to 253 second. If 0 is chosen – the monitoring page will not refresh automatically.

8.4 Network Setup page

The Network parameters are set on this page. The following parameters can be changed:

- **IP configuration** – IP Address can be static or dynamic (DHCP server should be present in the network);
- **IP address, Subnet mask , Default gateway** – these fields are active if IP address is static;
- **DNS** – these fields is mandatory, if domain names are used instead of IP addresses. By default DNS has the same Ip address as Default gateway;
- **Time Server** and **Time Zone** – these fields are not mandatory, they are used when e-mail must be sent;
- **Host Name** – up to 16 symbols, it appears as a “Subject” in sent e-mails;
- **MAC** – device MAC address.

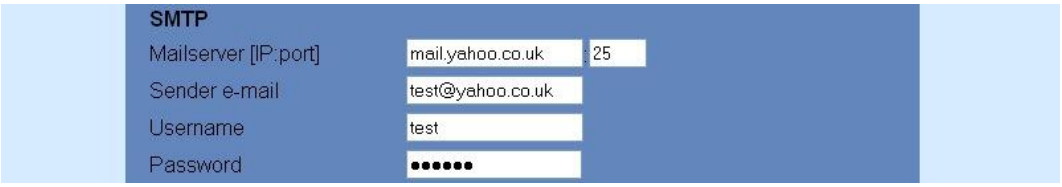


The good practice is to change the default IP address of controller immediately after first power-on. This will avoid collisions if many devices are used in the same network. It may be necessary to clear the arp cache, each time you connect a new device to the network. This is done by typing *arp -d* in the command prompt window of computer.

To set up the SMTP server details, the following fields should be completed:

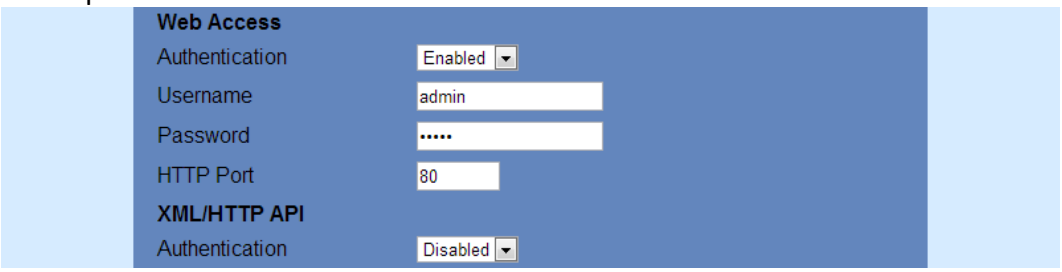
- **Mail server [IP:port]** – domain or IP address and port of SMTP mail server**;**
- **E-mail** – sender e-mail;
- **Username** and **Password** – authentication details for mail server**.**

When configuring the Mail server, note that TCW121B does not support SSL (Secure Socket Layer).



Username and password for WEB access can be changed in the Web Access section. Setting the authentication to “disabled” will provide access to monitoring page without entering user name and password. The HTTP port can be changed also in this section.

XML/HTTP API section controls the access to XML file and HTTP commands. Detailed information can be found in chapter 15 “XML and HTTP API commands”.

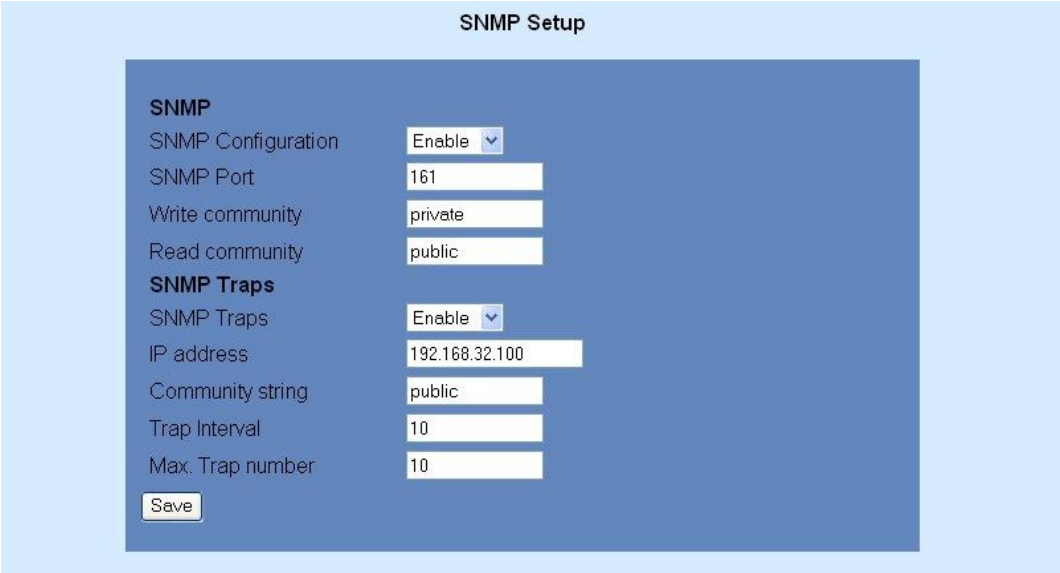


8.5 SNMP Setup page

TCW121B supports SNMP v.1. This enables the device to be part of large monitoring and control networks. The possible settings for “SNMP” section are:

- **SNMP Configuration** – enable/disable SNMP;
- **SNMP Port** – allows standard port changing;
- **Write/Read community** – performs client authentication;
- **SNMP Traps** – enable/disable SNMP trap messages;
- **IP address** – IP address of the receiving host;
- **Community string** – performs client authentication;
- **Trap Interval** - time interval in seconds for SNMP trap messages;

- **Max. Traps number** – maximum number of SNMP trap messages sent, if trap condition is present.



SNMP traps are sent if:

- event occurs (status change) on Digital Input 1 or Digital Input 2;
- measured voltage on Analog Input 1 or Analog Input 2 goes outside the range;
- measured temperature goes outside the range;
- measured humidity goes outside the range;
- restart condition.

9. SNMP setup

TCW121B can be configured and monitored through SNMP (Simple Network Management Protocol). This could be done using every SNMP v.1 compatible program. Parameters that can be changed, are grouped according to their functions in the tables below. To obtain a valid OID number it is necessary to replace the "**x**" symbol with "**1.3.6.1.4.1.38783"**. To save the changes **configurationSaved** (OID x.3.13.0) should be set to "1".

9.1 Product

OID	Name	Access	Description	Syntax
x.1.1.0	name	read-only	Device name	String
x.1.2.0	version	read-only	Firmware version	String
x.1.3.0	date	read-only	Release date	String

9.2 Setup -> network

OID	Name	Access	Description	Syntax
x.2.1.1.0	deviceIPAddress	read-write	Device IP address	IpAddress
x.2.1.2.0	subnetMask	read-write	Subnet Mask	IpAddress
x.2.1.3.0	gateway	read-write	Gateway	IpAddress
x.2.1.4.0	deviceMACAddress	read-write	Device MAC Address	OCTET STRING (SIZE(6))
x.2.1.5.0	dhcpConfig	read-write	DHCP configuration ON/OFF	INTEGER { ON(1), OFF(0) }
x.2.1.6.0	DNS	read-write	Domain Name Server address	IpAddress
x.2.1.7.0	Hostname	read-write	Device hostname	String (SIZE (0..38))

9.3 Setup -> SNMP

OID	Name	Access	Description	Syntax
x.2.4.1.0	SNMPConfiguration	read-write	SNMP Configuration	INTEGER { ENABLED(1), DISABLED(0) }
x.2.4.2.0	trapEnabled	read-write	TRAP messages ENABLED/DISABLED	INTEGER { Yes(1), No(0) }
x.2.4.3.0	trapReceiverIPAddress	read-write	TRAP receiver IP address	IpAddress
x.2.4.4.0	trapCommunity	read-write	TRAP community	String (SIZE (0..13))
x.2.4.5.0	trapInterval	read-write	TRAP messages interval	INTEGER (0..255)
x.2.4.6.0	maxNumberOfTraps	read-write	Maximum number SNMP traps	INTEGER (0..255)

9.4 Setup -> sensor1 -> temperature1

OID	Name	Access	Description	Syntax
x.2.5.1.1.0	temperature1Min	read-write	Temperature1 range (min. value)	INTEGER (-1000..2000)
x.2.5.1.2.0	temperature1Max	read-write	Temperature1 range (max. value)	INTEGER (-1000..2000)
x.2.5.1.3.0	temperature1Hyst	read-write	Hysteresis	INTEGER (-1000..2000)
x.2.5.1.4.0	temperature1Action	read-write	Temperature1 action	INTEGER {SEND_MAIL(1),NO_ACTION(0) }

9.5 Setup -> sensor1 -> humidity1

OID	Name	Access	Description	Syntax
x.2.5.2.1.0	humidity1Min	read-write	Humidity1 range (min. value)	INTEGER (-1000..2000)
x.2.5.2.2.0	humidity1Max	read-write	Humidity1 range (max. value)	INTEGER (-1000..2000)
x.2.5.2.3.0	humidity1Hyst	read-write	Hysteresis	INTEGER (-1000..2000)
x.2.5.2.4.0	humidity1Action	read-write	Temperature1 action	INTEGER {SEND_MAIL(1),NO_ACTION(0) }

9.6 Setup -> sensor2 -> temperature2

OID	Name	Access	Description	Syntax
x.2.6.1.1.0	temperature2Min	read-write	Temperature2 range (min. value)	INTEGER (-1000..2000)
x.2.6.1.2.0	temperature2Max	read-write	Temperature2 range (max. value)	INTEGER (-1000..2000)
x.2.6.1.3.0	temperature2Hyst	read-write	Hysteresis	INTEGER (-1000..2000)
x.2.6.1.4.0	temperature2Action	read-write	Temperature2 action	INTEGER {SEND_MAIL(1),NO_ACTION(0) }

9.7 Setup -> sensor2 -> humidity2

OID	Name	Access	Description	Syntax
x.2.6.2.1.0	humidity2Min	read-write	Humidity2 range (min. value)	INTEGER (-1000..2000)
x.2.6.2.2.0	humidity2Max	read-write	Humidity2 range (max. value)	INTEGER (-1000..2000)
x.2.6.2.3.0	humidity2Hyst	read-write	Hysteresis	INTEGER (-1000..2000)
x.2.6.2.4.0	humidity2Action	read-write	Temperature2 action	INTEGER {SEND_MAIL(1),NO_ACTION(0) }

9.8 Setup -> analogInput -> input1

OID	Name	Access	Description	Syntax
x.2.7.1.1.0	voltage1Min	read-write	Voltage1 alarm range (min. value)	String (SIZE (0..6))
x.2.7.1.2.0	voltage1Max	read-write	Voltage1 alarm range (max. value)	String (SIZE (0..6))
x.2.7.1.3.0	voltage1Hyst	read-write	Voltage1 hysteresis	String (SIZE (0..6))
x.2.7.1.4.0	voltage1Action	read-write	Voltage1 action	INTEGER {SEND_MAIL(1),NO_ACTION(0) }
x.2.7.1.5.0	voltage1Range	read-write	Voltage1 input range	INTEGER { 0_5V(0), 0_100V(1) }

9.9 Setup -> analogInput -> input2

OID	Name	Access	Description	Syntax
x.2.7.2.1.0	Voltage2Min	read-write	Voltage2 alarm range (min. value)	String (SIZE (0..6))
x.2.7.2.2.0	Voltage2Max	read-write	Voltage2 alarm range (max. value)	String (SIZE (0..6))
x.2.7.2.3.0	Voltage2Hyst	read-write	Voltage2 hysteresis	String (SIZE (0..6))
x.2.7.2.4.0	Voltage2Action	read-write	Voltage2 action	INTEGER {SEND_MAIL(1),NO_ACTION(0) }
x.2.7.2.5.0	Voltage2Range	read-write	Voltage2 input range	INTEGER { 0_5V(0), 0_100V(1) }

9.10 Setup -> digitalinput

OID	Name	Access	Description	Syntax
x.2.8.1.0	digitalinput1Action	read-write	Digital Input1 action	INTEGER { MAIL_IF_RISING(2), MAIL_IF_FALLING(1), NO_ACTION(0) }
x.2.8.2.0	digitalinput2Action	read-write	Digital Input2 action	INTEGER { MAIL_IF_RISING(2), MAIL_IF_FALLING(1), NO_ACTION(0) }

9.11 Setup -> relay

OID	Name	Access	Description	Syntax
x.2.9.1.0	relay1ControlledBy	read-write	Relay1 control item	INTEGER { DIGITAL_INPUT2(8), ANALOG_INPUT2(7), HUMIDITY2(6), TEMPERATURE2(5), DIGITAL_INPUT1(4), ANALOG_INPUT1(3), HUMIDITY1(2), TEMPERATURE1(1), MANUAL(0) }
x.2.9.2.0	relay2ControlledBy	read-write	Relay2 control item	INTEGER { DIGITAL_INPUT2(8), ANALOG_INPUT2(7), HUMIDITY2(6), TEMPERATURE2(5), DIGITAL_INPUT1(4), ANALOG_INPUT1(3), HUMIDITY1(2), TEMPERATURE1(1), MANUAL(0) }
x.2.9.3.0	relayPulseWidth	read-write	Digital Inputs mail recipient	INTEGER{ 0..255 }

9.12 Setup -> recipients

OID	Name	Access	Description	Syntax
x.2.10.1.0	recipient1EmailAddress	read-write	Recipient1 e-mail	String (SIZE (0..38))

9.13 Monitor&control

OID	Name	Access	Description	Syntax
x.3.1.0	digitalInput1State	read-only	Digital Input1 state	INTEGER { ON(1), OFF(0) }
x.3.2.0	digitalInput2State	read-only	Digital Input2 state	INTEGER { ON(1), OFF(0) }
x.3.3.0	relay1State	read-write	Relay1 state	INTEGER { ON(1), OFF(0) }
x.3.4.0	relay1Pulse	read-write	Relay1 pulse	INTEGER { ON(1), OFF(0) }
x.3.5.0	relay2State	read-write	Relay2 state	INTEGER { ON(1), OFF(0) }
x.3.6.0	relay2Pulse	read-write	Relay2 pulse	INTEGER { ON(1), OFF(0) }
x.3.7.0	voltage1x10Int	read-only	Voltage1 x10 in integer format	INTEGER{ 0..65000 }
x.3.8.0	voltage2x10Int	read-only	Voltage2 x10 in integer format	INTEGER{ 0..65000 }
x.3.9.0	temp1x10Int	read-only	Temperature1 x10 in integer format	INTEGER{ -400..1750 }
x.3.10.0	temp2x10Int	read-only	Temperature2 x10 in integer format	INTEGER{ -400..1750 }
x.3.11.0	humi1x10Int	read-only	Humidity1 x10 in integer format	INTEGER{ 0..65000 }
x.3.12.0	humi2x10Int	read-only	Humidity2 x10 in integer format	INTEGER{ 0..65000 }
x.3.13.0	configurationSaved	read-write	Configuration save status	INTEGER { SAVED(1), UNSAVED(0) }
x.3.14.0	restartDevice	read-write	Restart device	INTEGER { RESTART(1), CANCEL(0) }

10. XML and HTTP API commands

XML is often preferred choice when it comes to M2M communication and system integration. The monitored values are transmitted in status.xml file that can be easily processed by software applications.

Below is the structure of the status.xml file :

```
<Monitor>
  <Device>TCW121B</Device>                    Device Type
  <FW>tcw121_v2.01</FW>                       Firmware version
  <DigitalInput1>OPEN</DigitalInput1>         Digital input 1 state
  <DigitalInput2>OPEN</DigitalInput2>         Digital input 2 state
  <Relay1>ON</Relay1>                         Relay 1 state
  <Relay2>OFF</Relay2>                        Relay 2 state
  <AnalogInput1>5.2</AnalogInput1>            Analog input 1 value
  <AnalogInput2>2.4</AnalogInput2>            Analog input 2 value
  <Temperature1>12.2-</Temperature1>          Temperature 1 value
  <Temperature2>---</Temperature2>            Temperature 2 value
  <Humidity1>43.5</Humidity1>                 Humidity 1 value
  <Humidity2>---</Humidity2>                  Humidity 2 value
</Monitor>
```

If XML/HTTP API authentication is enabled, basic access authentication is required to access the **status.xml** file. The format of the command is shown in the table below:

XML/HTTP API authentication	**Format**
enabled	http://admin:admin@device.ip.address/status.xml
disabled	http://device.ip.address/status.xml

The relay outputs can be controlled by sending HTTP commands:

Command	**Description**
http://device.ip.address/status.xml?r1=1	Turn Relay 1 ON
http:// device.ip.address/status.xml?r1=0	Turn Relay 1 OFF
http://device.ip.address/status.xml?r2=1	Turn Relay 2 ON
http://device.ip.address/status.xml?r2=0	Turn Relay 2 OFF
http://device.ip.address/status.xml?tg1=1	Toggle Relay 1 state
http://device.ip.address/status.xml?pl1=1	Pulse Relay 1
http://device.ip.address/status.xml?r1=1&r2=1	Turn both relays ON
http://device.ip.address/status.xml?r1=0&r2=0	Turn both relays OFF

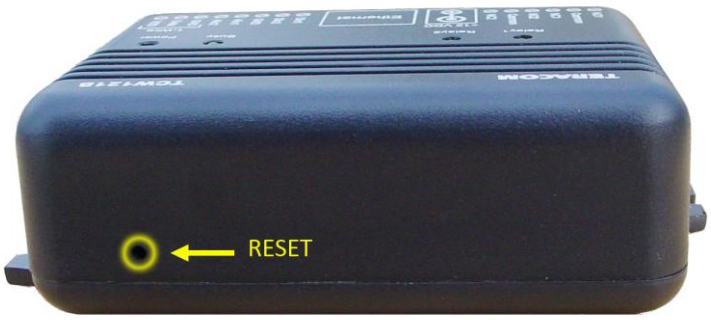
If XML/HTTP API authentication is enabled, basic access authentication is required to send HTTP commands. The format of the commands is shown in the table below:

XML/HTTP API authentication	**Format**
enabled	http://admin:admin@device.ip.address/status.xml?r1=1
disabled	http://device.ip.address/status.xml?r1=1

11. Restoring factory default settings

If the IP address or password is forgotten, **TCW121B** can be restored to its original factory default settings. To do this, please follow the steps below:

- Turn off the power supply;
- Press and hold the RESET button then turn on the power supply;
- The LED's STS and LOG will flash 14 times, after that they will turn on. In this moment the RESET button should be released.



The factory default settings are:

User Name (Admin)	admin
Password (Admin)	admin
IP Address	192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
SNMPConfiguration	disabled
readCommunity	public
writeCommunity	private

12. Firmware update

TCW121B supports remote firmware update. To update the device use the WEB interface.

Attention! Don't turn off the power supply during the update. Turning off the power supply will damage the device.

Rev. 4 – March, 2013